

What is Claimed is:

1. A system for directing memory allocation in a data processing system, said system comprising:

means, responsive to a request for allocation of memory by an application executing on said data processing system, for allocating a block of memory to said application;

means for translating a virtual address of said memory block allocated into its corresponding physical address within memory;

means for querying said physical address to determine if it is a physical address desired by said application, wherein said desired physical address is specified by said application and provided as a parameter value to components carrying out said memory allocation; and

means for passing said memory block for utilization by said application only when said physical address matches said desired physical address.

2. The system of Claim 1, further comprising:

means, responsive to said memory block allocated not having said desired physical address, for

allocating another block of memory to said application; and

repeating said translating and querying steps for said another block of memory, wherein said allocating and repeating steps are completed until the memory blocks allocated include said desired physical address.

3. The system of Claim 2, said means for allocating of memory further comprising means for concurrently locking down memory blocks allocated to prevent repetitive allocation of said memory blocks.

1 4. The system of Claim 2, further comprising means, when said memory block
2 allocated includes all of said desired physical address, for deallocating portions of said
3 memory block allocated that do not contain said desired physical address.

1 5. The system of Claim 1, wherein said desired physical address comprises a range
2 of memory addresses that is at least as large as a size of memory required by said
3 application within said range of memory addresses, said system further comprising
4 means for prompting a user to enter parameter values for said range of memory addresses
5 and said size of memory.

1 6. The system of Claim 1, wherein said data processing system is a multi-node
2 system having a first and a second processing system each with individual memory,
3 wherein:
4

5 said allocating means allocates a memory block on a memory of said second
6 processing system for an application executing on said first processing system; and
7

8 said translating means translates said virtual address to a physical address on said
9 memory of said second processing system.

1 7. The system of Claim 2, wherein:

2 said allocating means initially allocates all of the available memory to said
3 application; and

4 said comparing means includes immediately deallocating portions of said
5 allocated memory not within said range.

1 8. The system of Claim 2, further comprising means for selecting an algorithm for
2 completing said allocation and repeating steps, wherein said algorithm is selected from
3 among several available algorithms based on an indication by a user, wherein further,
4 absent said indication, a default algorithm is automatically selected.

1 9. The system of Claim 8, wherein said selecting means differentiates among several
2 calculation processes for determining a maximum amount of memory to allocate during
3 each allocating step, said calculation processes including: (1) calculating the maximum
4 amount of memory to allocate as an amount of physical memory in the system;(2)
5 calculating the maximum amount of memory to allocate as the result of (amount of
6 physical memory in the system - size of the range requested) + the amount of physical
7 memory required; (3) calculating the maximum amount of memory to allocate as an
8 amount of available physical memory in the system; and (4) calculating the maximum
9 amount of memory to allocate as the result of (amount of available physical memory in
10 the system - size of the range requested) + the amount of memory required by said
11 application, wherein said range is a range of addresses comprising said desired physical
12 address and one of said calculation processes is utilized.

1 10. The system of Claim 8, wherein said allocating means includes means for
2 allocating said memory block in a chunk size, which is gradually reduced as more
3 memory with said desired physical address is allocated.

1 11. The system of Claim 2, further comprising:
2 means for organizing allocated blocks of memory into address order;
3 means for determining a section of said allocated blocks with said desired
4 physical address that has maximum continuity; and
5 means for passing said section to said application, wherein when said section is
6 not as large as a memory space required, additional sections with said desired physical
7 address are allocated and passed, wherein a memory space required is an actual size of
8 physical memory required by the application and a size of said desired physical address
9 is at least as large as said memory space required.

1 12. The system of Claim 11, wherein said determining means comprises means for
2 moving a size X window over said allocated blocks, wherein X is the amount of memory
3 space required by said application.

1 13. The system of Claim 2, further comprising:
2 means for organizing said allocated memory in a pattern similar to a pattern
3 provided by a Window's operating system; and
4 said querying means includes means for conducting a search for a match to said
5 pattern provided by said Window's operating system.

1 14. The system of Claim 2, wherein said data processing system comprises a cache
2 with a cache size of Z units, wherein said system includes means for providing a
3 separation of Z units between allocated memory pages to enable tracking of cache
4 misses.

1 15. A method for allocating memory on a data processing system comprising:
2 receiving a specific physical memory location to allocate to processes of an
3 application;
4 executing said application on said data processing system, wherein said
5 application requires access to memory of said data processing system; and
6 responsive to an operation requesting access to memory by said application,
7 automatically assigning said specific physical memory location to said operation.

1 16. The method of Claim 15, further comprising:
2 calculating a physical memory location corresponding to a virtual address
3 provided by said operation; and
4 interactively allocating memory blocks and comparing a physical address of said
5 allocated memory blocks with said specific physical memory location, wherein, when
6 said allocated memory block is within said physical memory location said allocated
7 memory block is passed to said application.

1 17. The method of Claim 16, further comprising, responsive to some of said allocated
2 memory block comprising all required memory within said specific physical memory
3 location, deallocating all allocated memory block not within said specific physical
4 memory location.

1 18. The method of Claim 17, further comprising:
2 prompting a user for input of said specific physical memory location; and
3 prompting a user for selection of a particular algorithm to utilize within said
4 calculating and allocating steps, wherein said algorithm is selected from among: (1)
5 calculating the maximum amount of memory to allocate as an amount of physical
6 memory in the system;(2) calculating the maximum amount of memory to allocate as the
7 result of (amount of physical memory in the system - size of the range requested) + the
8 amount of physical memory required; (3) calculating the maximum amount of memory
9 to allocate as an amount of available physical memory in the system; and (4) calculating
10 the maximum amount of memory to allocate as the result of (amount of available
11 physical memory in the system - size of the range requested) + the amount of memory
12 required by said application, wherein said range is a range of addresses comprising said
13 desired physical address and one of said calculation processes is utilized.

1 19. A computer program product for directing memory allocation in a data processing
2 system, said program product comprising:

3 a computer readable medium; and

4 program instructions on said computer readable medium for:

5 responsive to a request for allocation of memory by an application
6 executing on said data processing system, allocating a block of memory to said
7 application;

8 translating a virtual address of said memory block allocated into its
9 corresponding physical address within memory;

10 querying said physical address to determine if it is a physical address
11 desired by said application, wherein said physical address desired is specified by
12 said application and provided as a parameter value to components carrying out
13 said memory allocation; and

14 passing said memory block for utilization by said application only when
15 said physical address matches said desired physical address.

1 20. The computer program product of Claim 19, further comprising program
2 instructions for:

3 responsive to said memory block allocated not having said desired physical
4 address,

5 allocating another block of memory to said application; and

6 repeating said translating and querying steps for said another block of memory,
7 wherein said allocating and repeating steps are completed until the memory blocks
8 allocated include said desired physical address.

1 21. The computer program product of Claim 20, said program instructions for
2 allocating of memory further comprising program instructions for concurrently locking
3 down memory blocks allocated to prevent repetitive allocation of said memory blocks.

1 22. The computer program product of Claim 20, further comprising program
2 instructions for:

3 when said memory block allocated includes all of said desired physical address,
4 deallocating portions of said memory block allocated that do not contain said desired
5 physical address.

1 23. The computer program product of Claim 19, wherein said desired physical
2 address comprises a range of memory addresses that is at least as large as a size of
3 memory required by said application within said range of memory addresses, said
4 program product further comprising program instructions for prompting a user to enter
5 parameter values for said range of memory addresses and said size of memory prior to
6 execution of said application.

1 24. The computer program product of Claim 19, wherein said data processing system
2 is a multi-node system having a first and a second processing system each with
3 individual memory, wherein:

4 said allocating program instructions allocates a memory block on a memory of
5 said second processing system for an application executing on said first processing
6 system; and

7 said translating program instructions translates said virtual address to a physical
8 address on said memory of said second processing system.

1 25. The computer program product of Claim 20, wherein:

2 said program instructions for allocating initially allocates all of the available
3 memory to said application; and

4 wherein said program instructions for comparing includes instructions for
5 immediately deallocating portions of said allocated memory not within said range.

1 26. The computer program product of Claim 20, further comprising program
2 instructions for selecting an algorithm for completing said allocating and repeating steps,
3 wherein said algorithm is selected from among several available algorithms based on an
4 indication by a user, wherein further, absent said indication, a default algorithm is
5 automatically selected.

1 27. The computer program product of Claim 26, wherein said program instructions
2 for selecting an algorithm includes instructions for differentiating among several
3 calculation processes for determining a maximum amount of memory to allocate during
4 each allocating step, said calculation processes including: (1) calculating the maximum
5 amount of memory to allocate as an amount of physical memory in the system; (2)
6 calculating the maximum amount of memory to allocate as the result of (amount of
7 physical memory in the system - size of the range requested) + the amount of physical
8 memory required; (3) calculating the maximum amount of memory to allocate as an
9 amount of available physical memory in the system; and (4) calculating the maximum
10 amount of memory to allocate as the result of (amount of available physical memory in
11 the system - size of the range requested) + the amount of memory required by said
12 application, wherein said range is a range of addresses comprising said desired physical
13 address and one of said calculation processes is utilized.

1 28. The computer program product of Claim 26, wherein said program instructions
2 for allocating said memory includes instructions for allocating said memory block in a
3 chunk size, which is gradually reduced as more memory with said desired physical
4 address is allocated.

1 29. The computer program product of Claim 20, wherein said algorithm comprises
2 a window function, wherein said program instructions further comprises instructions for
3 checking said allocated memory in blocks and sliding said window across said blocks to
4 determine whether said blocks fit within said window, wherein said window includes a
5 start address and an end address within said desired physical address.

1 30. The computer program product of Claim 20, further comprising program
2 instructions for:

3 organizing allocated blocks of memory into address order;

4 determining a section of said allocated blocks within said desired physical address
5 that has maximum continuity; and

6 passing said section to said application, wherein when said section is not as large
7 as a memory space required, additional sections with said desired physical address are
8 allocated and passed, wherein a memory space required is an actual size of physical
9 memory required by the application and a size of said desired physical address is at least
10 as large as said memory space required.

1 31. The computer program product of Claim 30, wherein said program instructions
2 for determining a section comprises instructions for moving a size X window over said
3 allocated blocks, wherein X is the amount of memory space required by said application.

1 32. The computer program product of Claim 20, further comprising program
2 instructions for:

3 organizing said allocated memory in a pattern similar to a pattern provided by a
4 Window's operating system; and

5 conducting a search for a match to said pattern provided by said Window's
6 operating system.

1 33. The computer program product of Claim 20, wherein said data processing system
2 comprises a cache with a cache size of Z units, wherein said method includes providing
3 a separation of Z units between allocated memory pages to enable tracking of cache
4 misses.

1 34. A data processing system comprising:
2 a processor that executes application processes;
3 a memory interconnect to said processor;
4 an operating system; and
5 means for allocating pre-selected, specific physical memory locations to said
6 application processes.

1 35. The data processing system of Claim 34, wherein said means comprises:
2 means for receiving a specific physical memory location to allocate to processes
3 of an application;
4 means for executing said application on said data processing system, wherein said
5 application requires access to memory of said data processing system; and
6 means, responsive to an operation requesting access to memory by said
7 application, for automatically assigning said specific physical memory location to said
8 operation.

1 36. The data processing system of Claim 35, further comprising:
2 means for calculating a physical memory location corresponding to a virtual
3 address provided by said operation; and
4 means for interactively allocating memory blocks and comparing a physical
5 address of said allocated memory blocks with said specific physical memory location,
6 wherein, when said allocated memory block is within said physical memory location said
7 allocated memory block is passed to said application.

1 37. The data processing system of Claim 36, further comprising means, responsive
2 to some of said allocated memory block comprising all said required memory within said
3 specific memory location, for deallocating all allocated memory block not within said
4 specific physical memory location.

1 38. The data processing system of Claim 37, further comprising:
2 means for prompting a user for input of said specific physical memory location;
3 and

4 means for prompting a user for selection of a particular algorithm to utilize within
5 said calculating and allocating steps, wherein said algorithm is selected from among: (1)
6 calculating the maximum amount of memory to allocate as an amount of physical
7 memory in the system; (2) calculating the maximum amount of memory to allocate as the
8 result of (amount of physical memory in the system - size of the range requested) + the
9 amount of physical memory required; (3) calculating the maximum amount of memory
10 to allocate as an amount of available physical memory in the system; and (4) calculating
11 the maximum amount of memory to allocate as the result of (amount of available
12 physical memory in the system - size of the range requested) + the amount of memory
13 required by said application, wherein said range is a range of addresses comprising said
14 desired physical address and one of said calculation processes is utilized.

1 39. The data processing system of Claim 35, further comprising means for testing
2 allocation of specific physical memory locations and response to said allocation.